No. XX.

Account of the fusion of Strontites, and volatilization of Platinum, and also of a new arrangement of apparatus. Communicated by Robert Hare, junr. member of the Society.

Read June 17th, 1803.

IT is known, I believe, to some of the members of the Philosophical Society, that a memoir on the supply and application of the blowpipe, which I had presented to the Chemical Society, was published in the commencement of last summer*. This memoir contains a description of a machine, termed an *hydrostatic blowpipe*, calculated to confine or propel the gases, for the production of heat, or other purposes; also an account of some experiments, in which by a concentration of caloric, till then unattained, substances were fused, which had been before deemed infusible. It was mentioned that alumine, silex, and barytes, were found susceptible of rapid fusion, and that the fusion of lime and magnesia, though extremely difficult, was yet, in a few instances partially attained. Platinum was described, as not only susceptible of fusion, but even of volatilization.

Being induced, last winter, to reinstate the apparatus, by which these experiments were performed, I was enabled to confirm my judgment of the volatilization of platinum, by the observation of Drs. Woodhouse and Seybert; for in the presence of these skilful Chemists, I completely dissipated some small globules of this metal, of about the tenth of an inch in diameter. In fact, I found platinum to be equally susceptible of rapid volatilization, whether exposed in its native granular form, or in that of globules, obtained from the orange coloured precipitate of the nitro-muriatic solution, by the muriate of ammoniac.

* Republished in the 14th volume of Tillock's Philosophical Magazine, and also in the annales de Chimie vol. 45.

About the same time, I discovered Strontites to be a fusible substance; for, having obtained a portion of this earth pure, from a specimen of the carbonat of strontites of Argyleshire in Scotland, I exposed it on charcoal to the flame of the compound blowpipe, after the manner described in my memoir above alluded to*. It became fused into a blackish semivitrious mass, in shape somewhat semiglobular.

In the performance of these and other experiments, I was associated with Mr. Benjamin Silliman, a gentleman of science and ingenuity, who had a short time before been elected Professor of Chemistry and Natural History, in Yale College, Connecticut.

In the course of our operations, having occasion for large quantities of the gases, we became desirous of avoiding the inconvenience of lading water in and out of the pneumatic tub, as this fluid rose or fell, in consequence of the filling or emptying of large air-holders and jars. This induced us to design an apparatus wherein this evil was avoided, and in which the pneumatic tub and hydrostatic blowpipe were united. This apparatus has since been executed by Mr. Silliman, in the laboratory of Yale College: and, as it proves to be convenient in operations requiring large quantities of the gases, I think it not improper to lay a drawing and description of it before the society. The drawing differs a little from the original, in the arrangement of parts, where alteration is obviously advantageous.

As the apparatus to be described, is little else than an union of the hydrostatic blowpipe, and pneumatic tub, it will of

* In that memoir I ventured to distinguish this flame by the word gaseous. This appellation has been objected to, as not sufficiently distinctive—an objection since rendered valid, by the discovery of the gaseous oxide of carbon, which had been confounded with hydrogen; and also by the consideration, that it does not distinguish between the flame of the hydrogen and oxygen gases when perfectly pure, and when contaminated by other substances held in a state of solution or mixture.

Certainly the term gaseous is equally applicable to the flame of the gaseous oxide, and to that of hydrogen gas; but it is equally certain that it was in direct opposition to the theory now almost universally received, that the editors of the New-York Medical Repository, declared all flame to be essentially gaseous: for it is well known that, with an exception for the combustion of the permanently elastic fluids mentioned above, flame is not ignited gas, but ignited vapour. However, as the term was badly chosen, I have written in the place of it, flame of the compound blowpipe, the propriety of which will appear from an inspection of the instrument by means of which the flame is supported, (See plate III. Fig. 2.)

course be easily understood by every one, who is acquainted with those machines. The pneumatic tub is necessarily familiar to every chemist; and for an explanation of the hydrostatic blowpipe, I beg leave to refer to my memoir before mentioned.

There is a transparent representation of the apparatus at Fig. 1, Plate, III. It consists of an oblong tub A, containing two chests B, C, which are open at bottom, and completely air-tight every where else. One of these chests B, is double the size of the other; and is divided by the air-tight partition K K, into two compartments. Thus three air-cells are formed, one by the smaller chest C, and two by the larger one B. These last mentioned cells communicate with the open air by means of cocks and pipes a, b, The other cell communicates with the air by means of the cock c.—At D, E, F, three circular bellows may be observed, each furnished with a suction-pipe, and pipe of emission. The suction-pipes may be observed at d e, f g, h i, severally entering their respective bellows; and the pipes of emission may be seen at k l, m n, o p, each issuing from the bottom of the bellows to which it appertains. The orifices of the pipes of emission k, m, p, under the air-cells, and those of the suction-pipes within the bellows, at e, g, i, are furnished with valves opening upwards. The bodies of the bellows consist of hose-leather sewed watertight, and distended by iron rings. They are nailed to the bottom of the tub, and to circular pieces of wood, which constitute the tops of the bellows. These tops are loaded with several pounds of lead, which keeps them depressed, when they are not elevated by means of the handles and rods. The table is affixed to the tub, by means of hooks and staples, so that it may be removed at pleasure.

At G H I, H I, pipes of delivery may be observed. These are furnished with cocks at H H, and conical mouths at I I. which last, are calculated for the insertion of an adjutage, for the purposes of an ordinary blow-pipe; or for the reception of the compound blowpipe at Fig. 2.

In order to prepare this apparatus for use, let the cock of the air-cell behind the partition K K, be closed, and let all

the rest be open. Then let as much water be poured into the tub, as will rise half an inch above the surface of the chests, and fill all the jars of the apparatus. The two air-cells whose cocks remained open, will now be filled with water, because the air had liberty to pass out of them: but the air-cell behind the partition K K, will remain empty of water, because, as its cock was closed, the air was confined, and the entrance of the water thereby prevented. The air-cell thus unoccupied by water, for the sake of distinction, I term the *regulator;* the propriety of which will be seen presently.

In operating with the common pneumatic tub, as the large jars and air-holders become filled with gas, it is necessary to lade out of the tub, the water displaced from them, as it would otherwise rise so high, as to overflow; and to float, and overturn the jars, no longer holding water. But in this new apparatus, this inconvenience is avoided, by allowing an escape of air from the regulator, adequate to the descent of water from the jars. For as this air, is necessarily subjected to hydrostatic pressure; it will escape if the cock a be opened, and a proportionate quantity of water, will subside into the regulator. When the jars and air-holders, are again filled with water, there would be a deficiency of this fluid, were not that which had been allowed to subside into the regulator, again expelled therefrom, by the action of the bellows at D. By the extension of these bellows, which is effected by means of their handle and rod, the valve of the pipe of emission at k, shuts; that of the suction-pipe at e, opens, and the air enters the bellows. The hand being removed from the handle, the lead on the top of the bellows depresses them; and the air within being compressed, shuts the valve of the suction-pipe, opens that of the pipe of emission at k, and enters the regulator, from which it expels a quantity of water equal to the bulk which the bellows gained by extension: and as all this is repeated at every stroke of the handle, it follows, that the water which had been allowed to subside into the regulator, may be quickly expelled therefrom.

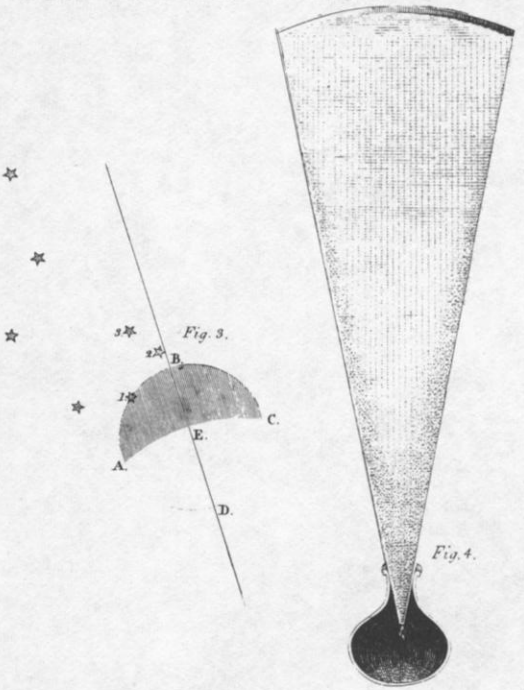
Fig. 3.
A.
B.
C.
D.
E.
1
2
3

Fig. 4.

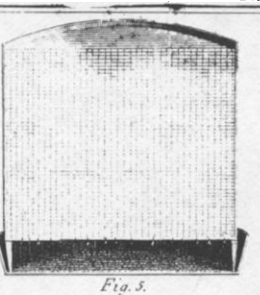
Fig. 5.


Fig. 6.

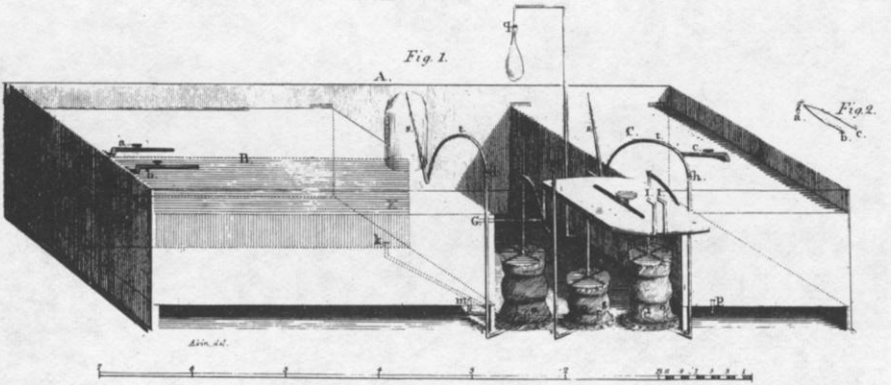
Fig. 1.
A.
B.
C.
G.
Fig. 2.

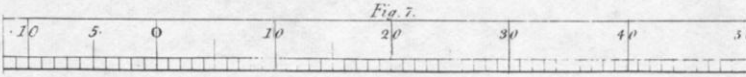
Fig. 7.
10
5
0
10
20
30
40
50

The air-cell formed in front of the partition K K, and that constituted by the smaller chest C, are used to contain factitious air; especially to confine sufficient quantities of the hydrogen and oxygen gases, for the production of intense heat, or the composition of water. As the contamination of hydrogen gas with atmospheric or pure air, might be attended with dangerous consequences, the air-cell constituted by the chest C, should be employed for this gas; as its separate situation, renders it secure from this danger. In order to prepare these cells for the reception of the gases, all the atmospheric air should be allowed to pass out, so that they may be completely filled with water. When they are to be filled with gas, the syphons s s, annexed to the hoses t t, inserted into the suction-pipes at d h, must be passed into the jars; and the bellows E, F, must be extended. The air of the jars will be drawn into the bellows, and from thence be expelled into the air-cells, from which it will displace an equal bulk of water. But, lest the expulsion of the water from the cells should cause it to rise too high in the tub, and to overflow; a correspondent depression should be effected in the meantime, by the escape of air from the regulator.

Gas may also be made to pass into the cells immediately from the retort, bottle, or matrass made use of in obtaining it without the intervention of the bellows, for if an elastic fluid be generated in the matrass at q, it must of necessity pass thro' the syphon inserted therein, and enter the air-cell at r.

It must be obvious, that as long as the chests are covered with water, any gases contained in the air-cells, will be subjected to hydrostatic pressure, and that of course when the cocks H H, are open, they will be propelled through the pipes of delivery, and pass out through any adjutages, inserted into their conical mouths at I, I.

If the upper parts of the chests C, D, E, F, be made of thick plank, they may be used as shelves to support the jars; as the thickness of the plank, will alone depress the aëriform fluid contained in the cells, sufficiently below the surface of the water, to afford the necessary pressure. But if from any cause, the pressure be not great enough, the chests should be depres-

sed until it becomes so; and the tub should be furnished with shelves at the usual height, to support the jars. Having subjected the gas in the cells to sufficient pressure, the velocity of efflux must be regulated by opening the cocks more or less. For this purpose, the perforations in the keys should be narrow and oblong; so as to admit of a gradual increase, or diminution, of the quantity of gas emitted.

The compound blowpipe represented by Fig. 2, consists of two common brass blowpipes whose points are made to meet in a perforation in the conical frustum of silver a. Now if the orifices b, c, of these pipes, be inserted into themouths I, I, of the pipes of delivery, it is obvious, that on opening the cocks H, H, any gases contained in the cells from whence these pipes issue, will be forced through them by the pressure of the water in the tub, and will meet in a point within the frustum. When the hydrogen and oxygen gases are thus made to meet, and are ignited, that intense heat is produced, by means of which I was enabled to accomplish the fusions, mentioned in a former part of this paper. But all this is fully explained in my memoir, to which I have so frequently referred, in the course of this communication.

It seems not improper to subjoin, that when the frustum of the compound blowpipe a, Fig. 2, is inserted into a receiver, and a supply of the hydrogen and oxygen gases is supported by means of the hydrostatic blowpipe, or the apparatus described in this paper, very convenient means are afforded of recomposing water—an operation of so much importance to modern chemical theory, that it can never become obsolete, or uninteresting to the cultivators of science. The advantage of the method consists in this, that the gases mix in the frustum before they become ignited, and must enter into the receiver in a state of combustion. This therefore is not dependent on the quantity of azot, or other noxious gas collected in the vessel; and as the burning gases may be made to enter under the pressure of a considerable column of water, the impure air, collected during the process, may be forced out through a tube into a mercurial apparatus; the operation may continue as long as desired, and the proceeds may be examin-

ed with the greatest accuracy. Mr. Silliman in recomposing water by means of this instrument, in a manner nearly similar to that which I have pointed out, found it extremely convenient and satisfactory.

No. XXI.

AN account of a Cock with two perforations, contrived to obviate the necessity of a vent-peg, in tapping air-tight casks. By Robert Hare, jun.

GENTLEMEN,

CONSIDERED merely as an item added to the list of philosophical contrivances the subject of the present communication would without doubt, be too unimportant to merit a place in a volume of your transactions: but I submit it with deference to the judgment of the society, whether as an addition, though a small one, to the comfort and convenience of society at large, it may not obtain a place, to which in any other light it can have no pretensions.

It is well known that an air-tight cask is usually tapped by means of two apertures, one in the upper part for the admission of air, the other below for the emission of the fluid; or, in other words, by means of a vent-peg and cock. This method would not be very objectionable, were the vent-peg always firmly replaced as soon as the admission of air becomes no longer necessary; but this is seldom attended to, and the consequence is the frequent sourness or vapidity of vinous liquors. The quantity of liquor annually spoiled by the omission of vent-pegs must be immense; and must be particularly great in those families where tapsters are too numerous to be responsible for neglect.

To obviate these evils, arising from the necessity of a vent-peg, I have contrived a cock. Fig. 1. Plate IV. with two